WHAT IS CLAIMED IS:

1. A process for modifying the surface characteristics of a substrate comprising:

applying a polymer comprising multiple epoxy groups and having a molecular weight of at least about 2000 to a substrate surface;

reacting only a portion of the epoxy groups on the polymer with functional groups on the surface of the substrate to bind the polymer to the surface at multiple points along the polymer; and

cross-linking the polymer to form a cross-linked polymeric anchoring layer bound to the substrate surface, wherein the anchoring layer comprises epoxy functionality.

2. The process of claim 1, further comprising grafting at least one material to the anchoring layer at the epoxy functionality.

3. The process of claim 2, wherein the at least one material comprises a polymerization initiator.

4. The process of claim 3, further comprising polymerizing a monomer on the anchoring layer at the polymerization initiator.

5. The process of claim 4, wherein the monomer is capable of radical polymerization.

6. The process of claim 4, wherein the monomer is selected from the group consisting of a vinyl aromatic, an acrylate, or a methacrylate.

7. The process of claim 2, wherein the at least one material comprises a polymer, a macromolecule, or a biomolecule.

8. The process of claim 1, wherein the polymer is applied to the substrate surface in a dip-coating process.

9. The process of claim 1, wherein the polymer is applied to the substrate surface heterogeneously.

10. The process of claim 1, further comprising grafting two or more materials to the anchoring layer.

11. The process of claim 1, further comprising heating the substrate to a temperature of between about 40°C and 150°C following application of the polymer to the substrate surface.

12. The process of claim 10, wherein the substrate is heated subsequent to application of the polymer comprising multiple epoxy groups to the substrate surface.

13. The process of claim 1, further comprising oxidizing the substrate surface prior to application of the polymer to the substrate surface.

14. The process of claim 1, wherein the polymer is selected from the group consisting of epoxidized polybutadiene, epoxidized polyisoprene, and poly(glycidyl methacrylate).

15. The process of claim 1, wherein the polymer is covalently bound to the surface at multiple points along the polymer.

16. The process of claim 1, wherein the substrate is a textile material, a fiber, a polymeric material, or an inorganic material.

17. A process for modifying the surface characteristics of a substrate comprising:

applying a polymer comprising multiple epoxy groups and having a molecular weight of at least about 2000 to a substrate surface;

reacting between about 5% and about 40% of the epoxy groups on the polymer with functional groups on the surface of the substrate to bind the epoxy-containing polymer to the surface at multiple points along the polymer;

reacting between about 20% and about 30% of the epoxy groups on the polymer to form cross-links such that a cross-linked polymeric anchoring layer is formed bound to the substrate surface, wherein the anchoring layer comprises epoxy functionality; and

grafting at least one material to the anchoring layer at the epoxy functionality.

18. The process of claim 17, wherein the at least one material comprises a polymerization initiator.

19. The process of claim 18, further comprising polymerizing a monomer on the anchoring layer at the polymerization initiator via an atom transfer radical polymerization.

20. The process of claim19, wherein the monomer is selected from the group consisting of a vinyl aromatic monomer, an acrylate, or a methacrylate.

21. The process of claim 17, wherein the at least one material comprises a polymer, a macromolecule, or a biomolecule.

22. The process of claim 17, wherein the epoxy-containing polymer is applied to the substrate surface in a dip-coating process.

23. The process of claim 17, wherein the epoxy-containing polymer is applied to the substrate surface heterogeneously.

24. The process of claim 17, further comprising grafting two or more materials to the anchoring layer.

25. The process of claim 17, further comprising oxidizing the substrate surface prior to application of the epoxy-containing polymer to the substrate surface.

26. The process of claim 17, wherein the epoxy-containing polymer is selected from the group consisting of epoxidized polybutadiene, epoxidized polyisoprene, and poly(glycidyl methacrylate).

27. The process of claim 17, wherein the epoxy-containing polymer is poly(glycidyl methacrylate).

28. A surface modified substrate comprising;

a substrate comprising a surface; and

a cross-linked polymeric anchoring layer bonded to the substrate surface, wherein the anchoring layer comprises polymers having a molecular weight of at least about 2000 bound to the substrate surface at multiple points along each polymer and cross-linked at multiple points along the length of each polymer, wherein the anchoring layer has a graft density on the substrate surface of at least about 0.3 chains per square nanometer.

29. The surface modified substrate of claim 28, wherein the anchoring layer is covalently bound to the substrate surface.

30. The surface modified substrate of claim 28, wherein the anchoring layer is at least 0.5 nanometers in depth on the substrate surface.

31. The surface modified substrate of claim 28, wherein the anchoring layer is between about 1 nm and about 10 nm in depth on the substrate surface.

32. The surface modified substrate of claim 28, wherein the anchoring layer is at least about 100 nm in depth on the substrate surface.

33. The surface modified substrate of claim 28, further comprising at least one material grafted to the anchoring layer.

34. The surface modified substrate of claim 33, wherein the at least one material comprises a polymeric material.

35. The surface modified substrate of claim 34, wherein the polymeric material is grafted to the anchoring layer at a graft density of between about 0.01 and about 2 chains/nm^2.

36. The surface modified substrate of claim 33, wherein the at least one material comprises a biomaterial.

37. The surface modified substrate of claim 33, wherein the at least one material comprises a macromolecule.

38. The surface modified substrate of claim 28, further comprising two or more different materials grafted to the anchoring layer.

39. The surface modified substrate of claim 28, wherein the substrate is a woven or nonwoven textile material.

40. The surface modified substrate of claim 28, wherein the substrate is a natural or synthetic fiber.

41. The surface modified substrate of claim 28, wherein the substrate is a polymeric material.

42. The surface modified substrate of claim 28, wherein the substrate is an inorganic material.

43. A smart material comprising:

a substrate comprising a surface;

a cross-linked polymeric anchoring layer bonded to the substrate surface, wherein the anchoring layer comprises polymers having a molecular weight of at least about 2000 bound to the substrate surface at multiple points along each polymer and cross-linked at multiple points along the length of each polymer, wherein the anchoring layer has a graft density on the substrate surface of at least about 0.3 chains per square nanometer;

a first material grafted to the anchoring layer; and

a second material grafted to the anchoring layer, wherein the first material and the second material display a response different from one another upon application of a known stimulus.

44. The smart material of claim 43, wherein the known stimulus is chemical stimulation due to contact of an agent.

45. The smart material of claim 43, wherein the known stimulus is due to radiant, mechanical, thermal, electrical, magnetic, or chemical stimulation.

46. The smart material of claim 43, wherein at least one of the first and second material is a polymeric material.

47. The smart material of claim 43, wherein at least one of the first and second material is a macromolecule.

48. The smart material of claim 43, wherein at least one of the first and second material is a biomolecule.